



# Fertility for actuaries



**Changes in fertility rates, especially when combined with increasing longevity, are one of the mega trends that are expected to have a profound impact on global societies over the coming decades. I, along with international colleagues Yair Babad and Sam Gutterman, recently published a paper<sup>1</sup> introducing actuaries to the topic of fertility. The paper described how to analyse fertility rates demographically and considered the causes and consequences of changes in fertility.**

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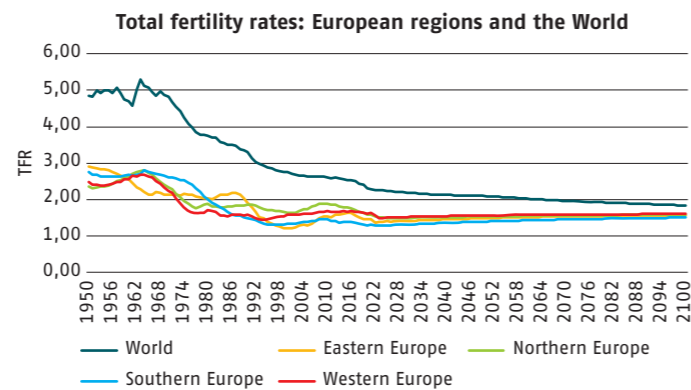
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## DEMOGRAPHIC METRICS

In fertility analysis, the crude birth rate (CBR), the number of births per 1,000 population, plays a similar role to the crude death rate, the number of deaths per 1,000 population, in mortality analysis and suffers from similar drawbacks. The CBR is not just affected by changes in underlying fertility but also by changes in the demographic profile of the population, such as the age and sex distribution. A better measure, although still not perfect, is the total fertility rate (TFR), which is the average number of live births a hypothetical cohort of women would have at the end of their reproductive period if they were subject during their whole lives to the fertility rates of a given period and if they were not subject to mortality. It is expressed as live births per woman. It is usually built up from fertility rates at single years of age or for 5-year age groups.

The following chart shows the UN's assumed TFRs, under its medium variant scenario, for different regions of Europe and, by way of comparison, for the World, from 1950 to the present and then projected for the rest of the century.



Source: United Nations, World Population Prospects 2024 medium variant (World Population Prospects – Population Division – United Nations) UNWPP2024

## WHAT'S HAPPENING WITH FERTILITY?

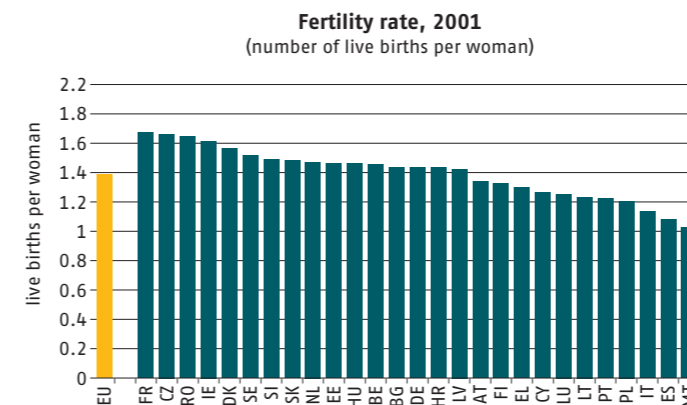
As the chart shows, fertility rates have been falling globally since the 1960s. In Europe fertility had fallen much earlier and has continued to fall. Fertility in all European countries is currently less than 2, below the so-called *replacement rate of fertility* of around 2.1. The replacement rate is that level of fertility at which a country, absent migration and with constant mortality rates, would, over time, maintain a stable population. European countries are not the only ones with below replacement fertility. In fact, over half of all countries are in this situation.

Explanations for why fertility has fallen to such a low, by historical standards, level can be provided at two levels, the how and the why. The greater availability and cultural acceptability of contraception and induced abortion are two of the causes along with postponement of marriage and an increase in childlessness among women. But these reasons explain more about how fertility has fallen than why. To explain why fertility has fallen, one needs to look at economic and sociological reasons. These include increases in the opportunity cost of having children and greater female education. This latter factor, as well as delaying union formation provides women with better career opportunities which delays the decision as to when to have children.

Cultural and religious attitudes and norms, including community and peer expectations, can have a significant impact on fertility rates. These factors are often related to the expected role of women in the family, community, and wider society. They include norms regarding the perceived optimum or minimum number of children that a couple may have. In spite of greater equality between men and women, it is still the women who take on more of the responsibility of rearing children, even if they are in employment.

According to the UN WPP2024: "Individuals and couples face multiple obstacles to achieving their desired family size, including demands of higher education, high costs of childcare, challenges to work-family balance, unequal division of household tasks between partners, care responsibilities for ageing parents and biological limits to the reproductive life span."

The following chart shows the TFR by EU country. The UK's TFR in 2021 was 1.75.



Source: Eurostat (Key Figures 2023 (europa.eu))

## CONSEQUENCES OF LOW FERTILITY

In 1937 the economist John Maynard Keynes warned that "...the *chaining up of one devil [population growth] may, if we are careless, only serve to loose another [under employment due to low demand for goods, services and capital] still fiercer and more intractable.*"<sup>2</sup>

There are a number of potential challenges arising from low fertility rates. One of the most obvious is that there will be an increase in the ratio of the number of older people to those of working age, however defined. There will be fewer working people contributing taxes to cover the costs of social security, healthcare and pensions. There may also be greater demands made upon those of working age to look after elderly relatives. A smaller workforce could also lead to lower economic growth and increased inflation as companies will have to pay higher salaries to retain or recruit staff, something that was a cause of the recent spike in inflation experienced in many countries.

In response to the relative or absolute reduction in their working age population, some countries have responded by trying to increase the female participation rate, increasing state pension ages or by allowing more immigration. Higher female participation rates can, ironically, exacerbate the problem by reducing fertility rates still further. Increased immigration can bring its own challenges. In addition to the cultural issues that it can pose, immigrants also age and therefore over time increase the size of the older population.

Other countries have introduced policies to try and reverse the long-term downward trends in their fertility rates. These include baby bonuses, reduced tax rates and employment guarantees. However, it is proving much harder to increase fertility rates than it was to reduce them. It is still not clear whether public policies are able to create increases in fertility rates that are stable and long term. Short term increases can arise when couples respond to incentives for having a baby by advancing the birth of their next child without increasing their ultimate family size.

## THE ROLE OF ACTUARIES

Actuaries working in the areas of social security and healthcare planning will already be working with fertility rates. However, as European populations are likely to continue to age, there will be more opportunities for actuaries to contribute their skills to help societies better understand the consequences of low and falling birth rates and to model the implications of different policy options. ■

1 – Babad, Y., Grenham, D., & Gutterman, S. (2023). Fertility and ageing – actuarial perspectives. *British Actuarial Journal*, 28, E6. doi:10.1017/S1357321723000065 Fertility and ageing – actuarial perspectives | *British Actuarial Journal* | Cambridge Core. Accessed 24 Sept. 2023.

2 – Keynes, J. M. 1937, *Some Economic Consequences of a Declining Population*